Remarks/Arguments

This letter is responsive to the Office Action mailed on August 31, 2006. The claims have been amended in response to the outstanding Office Acton.

The amendments to the claims have been made without prejudice and without acquiescing to any of the Examiner's objections. The amendments do not contain new matter and their entry is respectfully requested.

35 USC § 103

The Examiner rejected claims 1-17 under 35 USC 103 as being unpatentable over Smith et al as, in the opinion of the Examiner, it would have been obvious to adjust the molar concentration of olefin and/or water, and to adjust the content of alcohol in the water to an optimal level as the reaction is an equilibrium reaction.

The kinetics of a reversible reaction is based on the concentration of the product(s) and the concentration of the reactants. In order to increase the production of the reaction product(s), it is typically considered beneficial to remove the reaction product(s) from reaction zone to thereby increase the production of the reaction product(s).

The present application teaches a process for the production of alcohols from the catalytic hydration of olefins. Based upon reaction kinetics, a person skilled in the art would appreciate that in order to increase the production of the desired alcohol, it is advantageous to minimize the concentration of product at the reaction zone so as to drive the reaction forward. This is also taught by Smith et al. who state in column 1, line 64 to column 2, line 2:

> "Because the alcohol products are generally higher boiling than the reactants or other components in the feed, the alcohols (tertiary butyl alcohol or tertiary amyl alcohol) distill down the column increasing the driving force because the reaction product has been removed and cannot contribute to the reverse reaction (Le Chatelier's Principle)."

Claim 1 has been amended by including the step of heating the product from step (a) in a reboiler. Paragraph 61 of the application describes a liquid product recovery system that includes a reboiler and a volatiles return line. The liquid is heated in the reboiler, and a volatile fraction is returned through the volatiles return line to the interior cavity.

In addition, new step (d) has been inserted. Step (d) provides as follows.

"maintaing a sufficient mole fraction of alcohol in the reaction zone such that the product stream from the reboiler essentially comprises the corresponding alcohol and water."

As noted in paragraph 55 of the present application, by maintaining a sufficiently high mole fraction of alcohol in the reaction zone the olefin will be converted to the corresponding alcohol essentially without producing alternate reaction products. This represents a different operating paradigm than that taught by Smith et al who teaches controlling the amount of the reactant water by measuring the amount of water in the alcohol fraction of the lower part of the column and adjusting the water feed rate to maintain that amount above zero but below the azeotropic concentration. Further, as opposed to Smith et al who teaches that the removal of alcohol increases the driving force, the applicant has determined that fewer side reactions occur if the alcohol content is maintained at an elevated level in the reaction zone.

The Applicant submits that the invention disclosed in the present application seeks to maintain a high mole fraction of alcohol in the reaction zone and would not have been obvious in view of Smith et al, which teaches the adjustment of the water feed rate and the removal of alcohol from the reaction zone. Accordingly, the Applicant submits that claim 1, as amended, is not obvious in view of Smith et al.

In addition, the applicant submits that the elevated alcohol levels of each of claims 2 – 4 is not taught by Smith et al and that these claims are also not obvious in view of Smith et al.

In addition, the applicant also submits that Smith et al does not teach the water to olefin range of claim 10. In smith et al, the example uses a ratio of 1:1.5. This is derived as follows.

(a) water in number of moles:0.784/18 (18 is mol wt of water)
(b) C4 in number of moles: 5 x 0.7/56 (0.7 is the density of C4, 56 is the mol wt of C4 olefin)
Therefore, the ratio a/b=1.5

Accordingly, Smith et al uses a range that is half of the minimum set out in claim 10. Accordingly, the Applicant submits that claim 10 is not obvious in view of Smith et al.

Nonstatutory Double Patenting

The Examiner rejected claims 1, 6-12, 16 and 17 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 6,833,483. The applicant has filed a Terminal Disclaimer concurrently herewith. Therefore, the applicant submits that this rejection is moot.

35 U.S.C 101

The Examiner rejected claims 13-15 under 35 U.S.C. 101 as claiming the same invention as that of claims 1-6 of prior U.S. Patent No. 6,833,483. By this response, the applicant has cancelled claims 13-15 without prejudice.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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